



August 25, 2003

Mrs. Natalie R. Roark, P.E.
Missouri Department of Natural Resources
Hazardous Waste Program
P.O. Box 176
Jefferson City, MO 65102

Re: Administrative Order on Consent for Corrective Action #VII-94-H-0024 (AOC) and
Post-Closure activity at Industrial Service Corporation (ISC).

Dear Mrs. Roark:

This letter report is prepared to convey the results of the fifth round of nine bi-monthly sampling events intended to evaluate the effectiveness of the groundwater extraction and treatment system. System operation commenced on June 6, 2002. An installation report was prepared and submitted in July describing the installation and first month of system operation. This progress report is for the period from April 25, 2003 to June 30, 2003.

System Modifications

A recommendation to install two additional extraction wells was included in the previous progress report. That recommendation was verbally approved and later confirmed in a correspondence dated June 6, 2003. Wells PW-3 and PW-4 were installed during the week of May 19, 2003. Trench construction, pump installation, and plumbing connections were completed during the following week. Figure 1 has been modified to depict the location of the new extraction points and the general location of the utility trench connecting them to the existing system. Boring logs with well completion diagrams are included in the attachments. The new wells were put into service on June 4, 2003.

System Operation and Aquifer Response

A graph of the volume of groundwater extracted on a daily basis during the reporting period is included for reference. The graph indicates that the volume increased from an average 6000 g.p.d. to an average of 11,000 g.p.d after the addition of these extraction points. The amount of precipitation also increased beginning about the same time. Total precipitation in May was 3.19 inches and increased to 7.69 inches during June. It is therefore difficult to determine if the increase in flow was due primarily to the addition of the pumps or to the increased volume of groundwater to be pumped.

There were four interruptions to system operation between May 5 and May 17 due to float level switch failures. This problem was temporarily corrected on May 17, and permanently replaced with a new limit switch assembly on June 4, 2003. During the reporting period, there were no further interruptions to continuous system operation after May 17.

Pumps PW-1 and PW-2 experienced several interruptions beginning on June 8. The Hammerhead pumps are float actuated. During this period of time the pumps would operate for a while and then simply fail to restart as the water level rose. The pumps could be restarted manually but would not operate reliably. They were pulled and cleaned several times. On June 19 pump PW-2 was removed from service and sent to the manufacturers representative for repair. It was temporarily replaced with a Solo II pump which operated successfully, but at diminished capacity from the larger Hammerhead pump. Pump PW-1 has operated successfully since that date.

A hydrograph is also enclosed for this reporting period. Water level measurements were recorded six times. Due to increased precipitation, pump and system failures, combined with infrequent measurements, it is difficult to draw many conclusions from the graph. Water levels at wells PW-3 and PW-4 have reached the design level of the Blue River channel elevation. Water levels at PW-1 and PW-2 are elevated corresponding to the inefficiencies in operation previously discussed.

At the time of this writing another contributing factor has been identified. As a time saving matter, water level measurements are usually taken coincident with backflushing the adsorber tanks. One of the technicians responsible has been turning the system off during this procedure and then recording the water level data. As discussed in prior reports, water level recovery responds very rapidly and thus renders measurements recorded during these brief periods useless. The system will no longer be turned off in order to backflush the adsorber units. This problem not only affects data recorded during this reporting period but through the month of July also.

Following the recommendation of Mr. Bruce Stuart at a meeting held July 15, we are purchasing automatic water level recording devices for this site. Three instruments will be purchased and installed in the GW-11 well nest in order to monitor water levels at each horizon identified at the site. It has been established that water levels fluctuate consistently for all wells installed within the A and B horizons. These water level loggers will maintain a daily record of observations for wells GW-11A, GW-11B, and GW-11C. Based on these observations it will be possible to infer similar fluctuations at other wells installed within the same zone. Manual water level measurements will continue to be recorded periodically at all well locations to verify the automatic levels and to confirm that the consistent relationship of wells installed within the same zone remains unchanged.

Figure 2 has been prepared and is enclosed to illustrate the potentiometric surface of the aquifer as it appeared on May 19 during the sampling event conducted at that time. The map indicates a flow direction to the west at a gradient of approximately 0.14 ft/ft. The equipotential lines are influenced radially about the pumping wells and flow is modestly reversed from the monitoring wells located immediately down-gradient of these extraction points.

Groundwater Analytical Results

Samples of groundwater were collected from the approved subset of wells for this evaluation on May 19, 2003. All samples were collected following the approved procedures in the Sampling and Analysis Plan (SAP). All samples were analyzed by Environmental Science Corporation, Mt. Juliet, TN for the volatile organic compounds (VOC) contained in Attachment A of the SAP. Samples were also collected from wells GW-8B, GW-9B, and GW-10B for the analysis of the compound 1,4-Dioxane at a lower reporting level. This analysis was completed by Zymax Forensics and Envirotechnology located in San Luis Obispo, CA. Copies of the analytical reports are enclosed for reference.

A data validation review was provided by Mr. Joseph Palausky with Terrachem, Inc. A copy of his complete report is included in the attachments. Due to a low calibration standard of 100 ug/L, the reporting level for 1,4-dioxane was elevated to 100 ug/L from the previously reported level of 50 ug/L. Eighteen samples were affected. The reported concentration for that compound of 2300 ug/L for the sample collected from the influent trench is considered estimated because the result is above calibration. Detections of the compound chloroethane were considered estimated due to the calibration response factor being outside criteria.

The data is summarized and presented in the following table. Only compounds with reported detections are included in the table. Compounds not detected in the sample are so indicated by the letters BDL (below detection level) and are followed by the reportable concentration for that analyte in that sample.

ISC-KC FIFTH BI-MONTHLY ANALYSIS

	PW-1	PW-2	TRENCH	EFFLUENT	GW-2R	GW-3	GW-4	EPA-R-1
benzene	BDL(1)	BDL(1)	7.1	BDL(1)	16.0	51.0	25.0	140.0
n-butylbenzene	BDL(1)	BDL(1)	BDL(1)	BDL(1)	2.9	BDL(1)	1.0	BDL(1)
sec-butylbenzene	BDL(1)	BDL(1)	BDL(1)	BDL(1)	2.8	BDL(1)	BDL(1)	BDL(1)
chlorobenzene	BDL(1)	BDL(1)	BDL(1)	BDL(1)	2.9	1.0	BDL(1)	3.2
chloroethane	BDL(1)	BDL(1)	BDL(1)	BDL(1)	6.0 (J)	8.6 (J)	2.0 (J)	1.5 (J)
1,2-dichlorobenzene	BDL(1)	BDL(1)	BDL(1)	BDL(1)	5.6	4.0	1.9	BDL(1)
1,4-dichlorobenzene	BDL(1)	BDL(1)	BDL(1)	BDL(1)	8.4	7.5	BDL(1)	BDL(1)
1,1-dichloroethane	BDL(1)	2.5	2.8	1.2	BDL(1)	1.4	2.1	9.6
1,1-dichloroethene	BDL(1)	BDL(1)	BDL(1)	BDL(1)	BDL(1)	BDL(1)	BDL(1)	BDL(1)
cis-1,2-dichloroethene	BDL(1)	6.3	BDL(1)	BDL(1)	BDL(1)	BDL(1)	1.2	2.0
1,4-dioxane	150.0	450.0	2300.0 (J)	350.0	650.0	140.0	210.0	340.0
ethylbenzene	BDL(1)	BDL(1)	BDL(1)	BDL(1)	BDL(1)	BDL(1)	35.0	7.5
isopropylbenzene	BDL(1)	BDL(1)	BDL(1)	BDL(1)	5.2	BDL(1)	2.0	1.2
methyl tert-butyl ether	4.6	14.0	52.0	10.0	5.0	8.6	2.9	64.0
naphthalene	BDL(5)	BDL(5)	BDL(5)	BDL(5)	BDL(5)	5.1	60.0	26.0
n-propylbenzene	BDL(1)	BDL(1)	BDL(1)	BDL(1)	5.4	BDL(1)	3.3	2.3
tetrachloroethene	BDL(1)	BDL(1)	BDL(1)	BDL(1)	BDL(1)	BDL(1)	BDL(1)	1.3
toluene	BDL(5)	BDL(5)	BDL(5)	BDL(5)	BDL(5)	BDL(5)	BDL(5)	21.0
trichloroethene	1.2	7.7	BDL(1)	BDL(1)	BDL(1)	BDL(1)	BDL(1)	BDL(1)
trichlorofluoromethane	BDL(1)	BDL(1)	BDL(1)	BDL(1)	BDL(1)	BDL(1)	BDL(1)	1.5
1,2,4-trimethylbenzene	BDL(1)	BDL(1)	BDL(1)	BDL(1)	BDL(1)	8.7	12.0	26.0
1,3,5-trimethylbenzene	BDL(1)	BDL(1)	BDL(1)	BDL(1)	2.3	10.0	5.8	6.8
vinyl chloride	BDL(1)	BDL(1)	BDL(1)	BDL(1)	BDL(1)	BDL(1)	BDL(1)	BDL(1)
xylene	BDL(3)	BDL(3)	BDL(3)	BDL(3)	BDL(3)	24.0	77.0	140.0

ISC-KC FIFTH BI-MONTHLY ANALYSIS (cont.)

[illegible]

A total of twenty-four compounds were detected from the analyses of these wells. Of these twelve were reported at concentrations which exceeded a level of concern. Seven of these compounds were detected in samples analyzed from wells impacted by LNAPL and were not reported in samples collected from down-gradient locations.

Benzene was reported in concentrations ranging from 7.1 ug/L at the trench sump to 140 ug/L at well EPA-R-1. Each reported concentration exceed all of the levels of concern for this compound. Naphthalene was reported at well EPA-R-1 at a concentration of 26 ug/L and at GW-4 at a concentration of 60 ug/L in exceedance of the state MCL for groundwater as well as RBC and PRG guidance levels. Chloroethane was reported from product wells GW-2R and GW-3 at concentrations in excess of RBC and PRG levels although these values are considered estimates. The compound 1,4-dichlorobenzene exceeded these guidance levels at wells GW-2R and GW-3 as well. Ethylbenzene and 1,2,4-trimethylbenzene was also reported above these guidance levels at locations GW-4 and EPA-R-1. Tetrachloroethene was detected only at well EPA-R-1. It was reported at a concentration of 1.3 ug/L which exceeds the RBC and PRG guidance levels.

Isoconcentration maps have been prepared for compounds reported in excess of levels of concern at down-gradient locations. Due to the fact that 1,1-dichloroethene was detected at well GW-11C only, the map is replaced with the compound 1,1-dichloroethane in Figure 3. Although this compound is not reported above any level of concern, it is useful in gaining an understanding of the shape and extent of the dissolved phase plume.

Figure 4 is an isoconcentration map of the compound 1,4-dioxane. Concentrations were significantly reduced during this round of analyses at wells impacted by LNAPL. There was also a modest reduction at well GW-11C. Concentrations reported from the analysis by method 8260 were below the reporting limit at wells GW-8B, 9B, and 10B. Samples were also collected from these wells for analysis by a modified method 8270 with isotope dilution which is capable of a lower reporting level at 1 ug/L. Values obtained from this analysis was used in the construction of these isoconcentration lines. All reported concentrations are in exceedance of CALM, RBC, and PRG guidance levels.

Figure 5 is an isoconcentration map of the compound cis-1,2-dichloroethene. This map is similar to the previous map submitted for this compound. The concentration reported from location EPA-R-1 provides improved definition in the up-gradient direction. Only the concentration reported from well GW-11C is in exceedance of the RBC and PRG guidance levels for this compound.

Figure 6 is an isoconcentration map of the compound methyl tert-butyl ether. This compound is reported at concentrations in excess of the CALM GTARC level of 20 ug/L at well EPA-R-1 and the interceptor trench. It is also reported at concentrations in excess of the PRG level of 13.0 ug/L at extraction point PW-2. Reported concentrations exceeded the RBC level of 2.6 ug/L at wells PW-1, GW-2R, GW-3, GW-4, GW-6B, GW-10B, and GW-11C. It was detected at concentrations below all levels of concern at wells GW-9B and GW-11B. The compound was not detected in samples from wells GW-8B and GW-11A.

Figure 7 is an isoconcentration map of the compound trichloroethene. It was reported from two locations (PW-2 and GW-11C) in excess of the MCL's and all levels of concern. It was also reported at wells GW-6B, GW-9B, and PW-1 above the RBC and PRG guidance levels.

Figure 8 is an isoconcentration map of the compound vinyl chloride. This compound was reported at well GW-11C in excess of the MCL's and all levels of concern. It was also reported at wells GW-8B, GW-9B, and GW-10B in excess of RBC and PRG guidance levels at a concentration of 1.6 ug/L. The compound was not detected in samples collected from all other locations.

Time-series charts have also been prepared for the down-gradient wells which have reported detections of VOC's. A total of seven analytes have been detected in these wells. The compound cis-1,2-dichloroethene was added to the list of analytes during the second quarter of 2000. Analytes 1,4-dioxane and methyl tert-butyl ether were added in the second quarter of 2002. The charts are prepared from the date of each well's installation to the present. Due to the reduction in laboratory reporting limit beginning in March 2003, the baseline values have been reduced for many of the compounds because a value $\frac{1}{2}$ the reporting limit is used to represent a non-detect value.

The chart of well GW-6B documents the longest period of time. Concentrations of all detected compounds generally diminish over time until the extraction system was initiated in June 2002. There was a decrease in the concentration of six of the seven analytes included in the chart. Chloroethane has not been detected at this location since the second quarter of 1997.

The chart of well GW-8B indicates declining concentrations of 1,4-dioxane and cis-1,2-dichloroethene. All other compounds have been reported non-detect since the fourth quarter of 2002.

The chart of well GW-9B indicates a decline in the concentrations of 1,4-dioxane, vinyl chloride, methyl-tert-butyl-ether, and 1,1-dichloroethane. The concentrations of trichloroethene and cis-1,2-dichloroethene increased.

The chart for well GW-10B indicates a slight decline or steady values for the compounds 1,4-dioxane, cis-1,2-dichloroethene, and methyl-tert-butyl-ether. The compounds 1,1-dichloroethane, chloroethane, and vinyl chloride showed an increase in concentration. Trichloroethene remained non-detect.

There was a decline in the reported concentrations of all compounds at well GW-11B with the exception of 1,4-dioxane. That compound was reported at 77 ug/L in a sample analyzed by Zymax at the lower 1 ug/L reporting level. Although the compound was not detected in this or the previous round of analysis by ESC at a reporting level of 100 ug/L, it has declined from the previous high concentration of 320 ug/L reported by ESC in the January, 2003 round of analysis.

Concentrations of all compounds detected at well GW-11C were stable or exhibited a slight decline with the exception of trichloroethene which increased from 6.4 ug/L to 8.0 ug/L.

Mrs. Natalie R. Roark, P.E.
August 25, 2003
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Time-series graphs have also been prepared for wells which have been reported with a layer of LNAPL at any time in the past. This time period begins with samples collected by a micro-purge sampling technique initiated during the third quarter of 2000. Samples were not able to be collected from wells GW-2R and EPA-R-1 during the fourth quarter of 2000. A sample was also not collected from well GW-2R during the fourth quarter of 2001.

Some compounds at lower concentrations are eliminated periodically from the graphs because of elevated reporting levels due to required sample dilutions. The graph of EPA-R-1 is a good example. The laboratory was successful in reducing the impact of sample dilutions beginning with the fourth quarter 2002 analysis. The lower reporting levels have also had a positive impact on the detection of these compounds.

Generally, the detected compounds are BTEX and associated analytes. Concentrations fluctuate with time and until now have demonstrated no evidence of a sustained trend. There is now some evidence that concentrations of many of the compounds detected are declining. This is most strikingly evidenced by the graph of EPA-R-1 and similarly supported by the graphs of wells GW-3 and GW-4. It was expected that the removal of contaminated soil in the summer of 2000 would have a positive effect on these groundwater monitoring points over a period of time. It appears that decline might have been accelerated and is more consistent due to the addition of the groundwater extraction system.

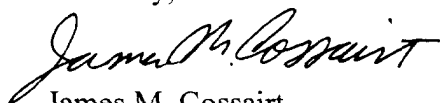
Summary

The data continues to indicate that the extraction system may be providing a positive influence on the groundwater contaminant plume at the facility. A cone of depression has been established surrounding the extraction wells and has reversed flow from monitoring locations installed immediately down-gradient while the system is operational. This effect on the groundwater potentiometric surface should only be amplified with the addition of two more extraction wells.

The evaluation period has been extended six months and will add three more bi-monthly sampling events.

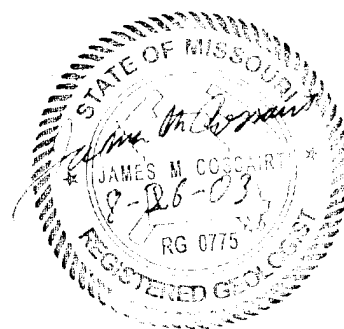
We are encouraged with the analytical evidence that the extraction system may be affecting concentrations in the up-gradient LNAPL wells. We are eager to see the impact of the additional extraction points on these as well as the down-gradient perimeter locations.

Sincerely,



James M. Cossairt
Senior Project Geologist

c: David Garrett, EPA Region VII
Darleen Groner, MDNR



Borelogs

STATIC WATER LEVEL (BLS)		
	While Drilling	After Boring
Depth (Ft)	22.0'	19.82'
Time		
Date	5/21/03	5/29/03

[illegible]

BOREHOLE LOG

LOCATION DESCRIPTION

164' SOUTH OF LIVERS BRONZE BLDG. AND 8.5' EAST OF
FENCE ADJACENT TO INTERSTATE I-435

BORING/WELL ID	PW-4	CLIENT	I. S. C.
RIG TYPE & NUMBER	MOBILE B-61/7160	PROJECT CODE	ISC-KC
DRILLING METHOD	HOLLOW STEM	START DATE	5/20/03
SAMPLING METHOD	CUTTINGS	FINISH DATE	5/21/03
BORING DIAMETER	10 1/4	TOTAL DEPTH	80.0'
GEOLOGIST	M. Cossaint		
DRILLING CREW	G. Guera/M. Teachout, W. Baqby		

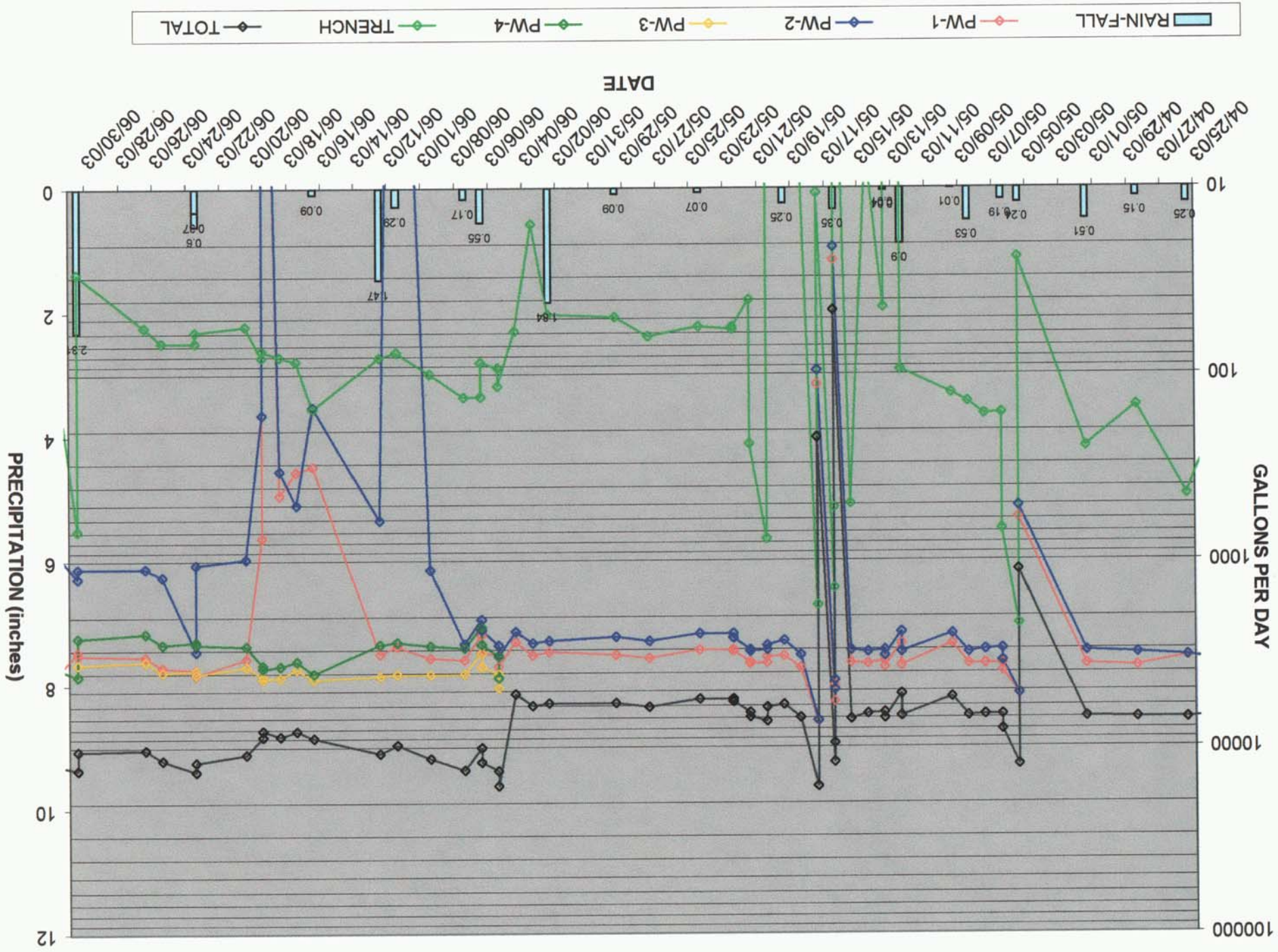
ELEVATIONS (Ft)		
PAD	TOC	SWL
771.3	770.3	749.22

STATIC WATER LEVEL (BLS)		
While Drilling After Boring		
Depth (ft)	28.0'	22.08'
Time		
Date	5/20/03	5/21/03

[illegible]

Graphs

EXTRACTION FLOW DATA



ISC-KC HYDROGRAPH

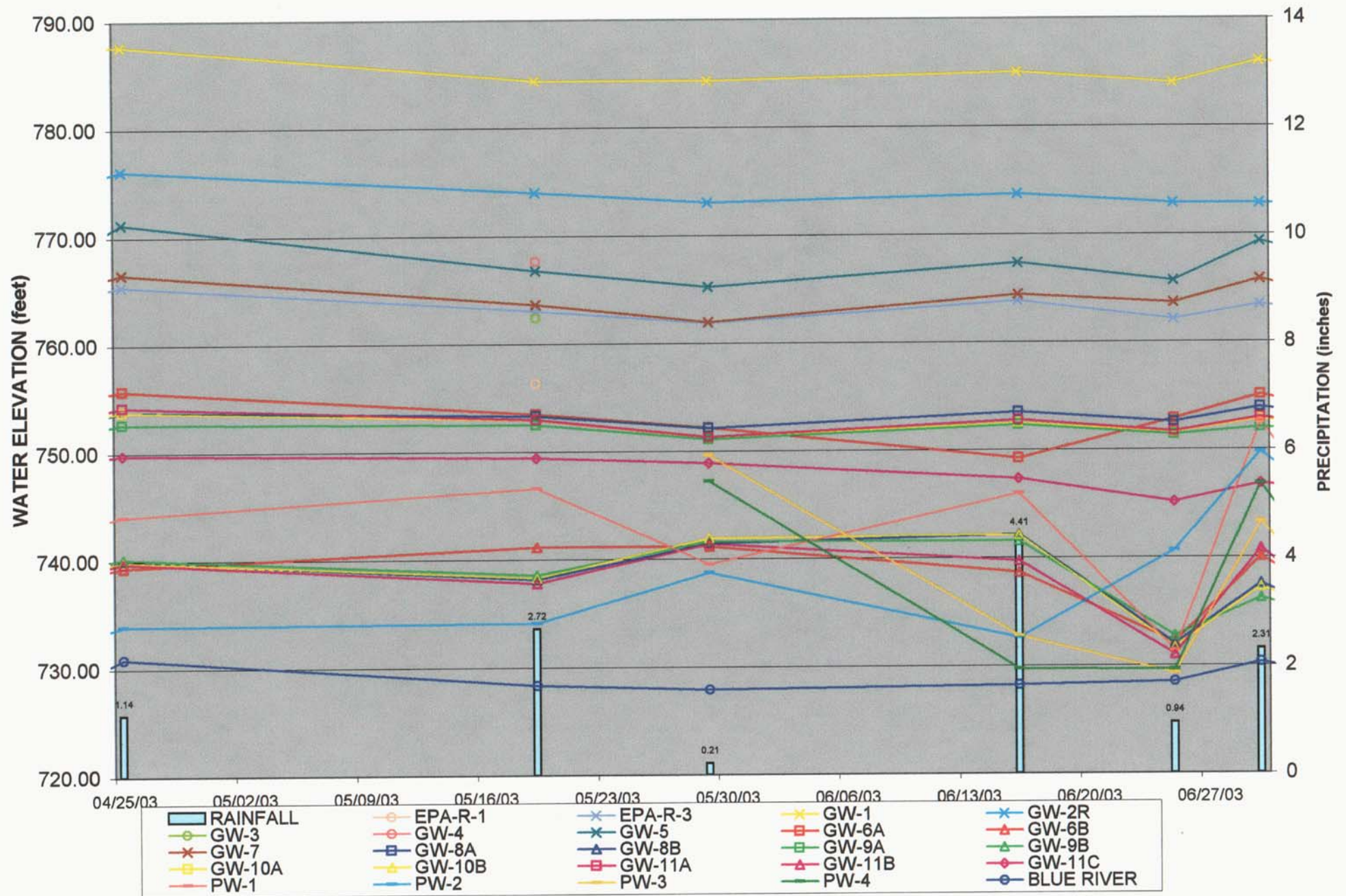


Figure 1-2

LEGEND

- EXTRACTION WELLS
- MONITOR WELLS
- - - FLOW LINE TO DISCHARGE
- SANITARY SEWER LINE

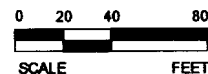
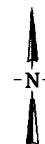
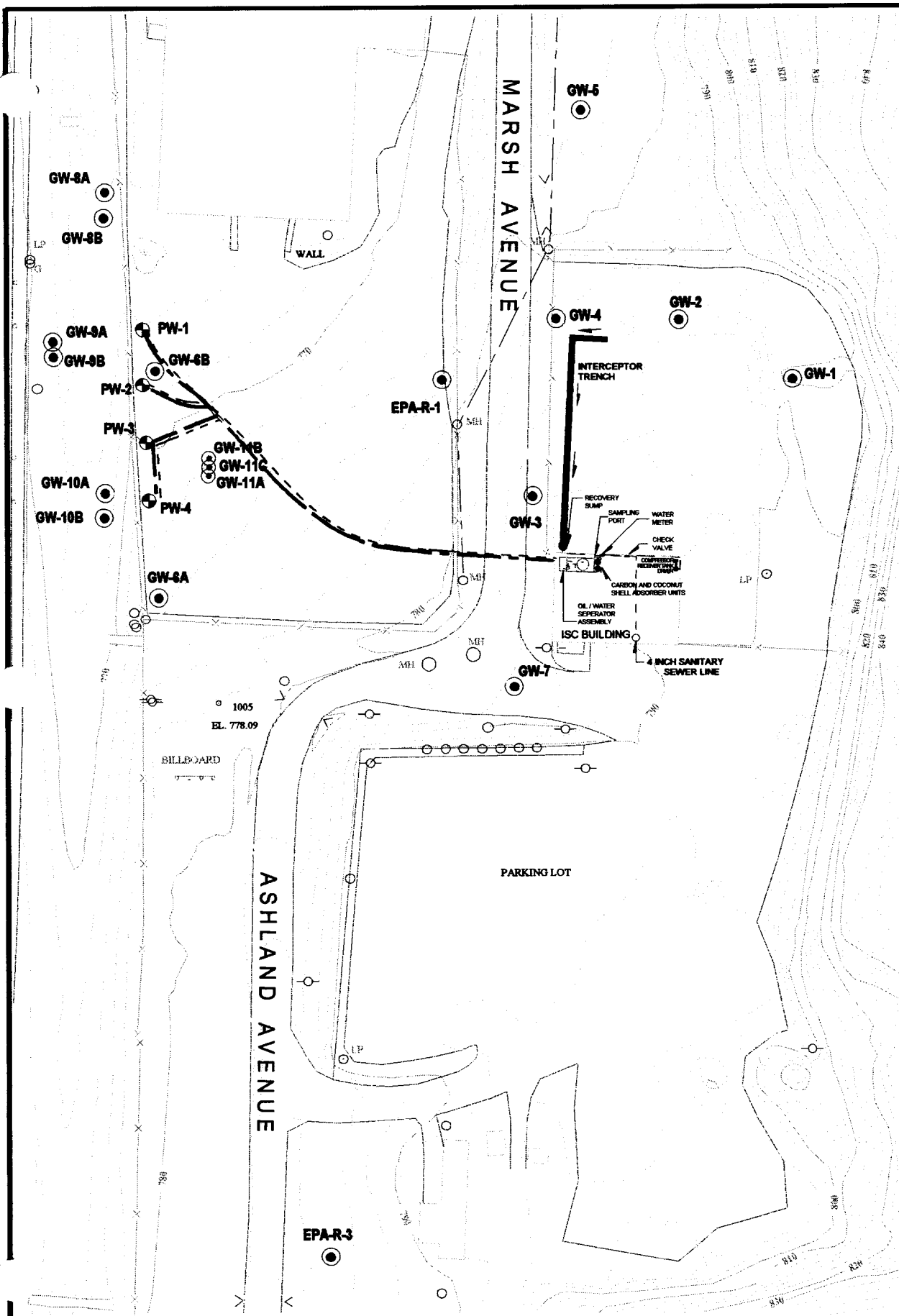


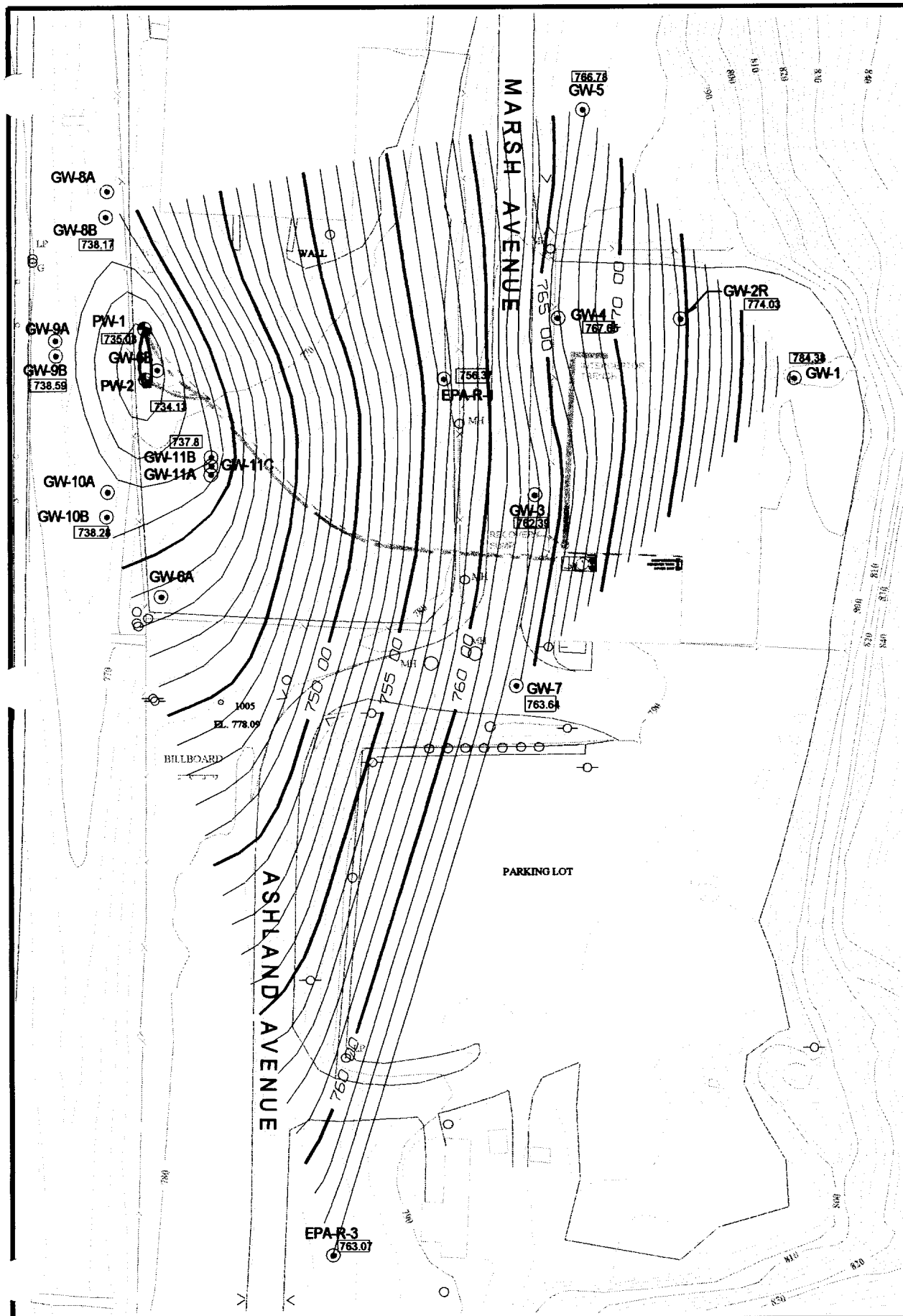
FIGURE
1

DATE	6/18/03
DESIGNED	JMC
DETAILED	JMC
CHECKED	SRA

INDUSTRIAL SERVICE CORP.
1633 MARSH AVE.
KANSAS CITY, MO 64126

SITE MAP





LEGEND

- MONITOR WELLS
- ⊗ EXTRACTION WELLS
- - - AIR LINE
- - - EFFLUENT LINE
- | EQUIPOTENTIAL LINE - 5.0 FOOT
- | EQUIPOTENTIAL LINE - 1.0 FOOT
- 767.85 STATIC WATER ELEVATION (5/19/03)

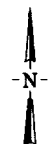


FIGURE
2

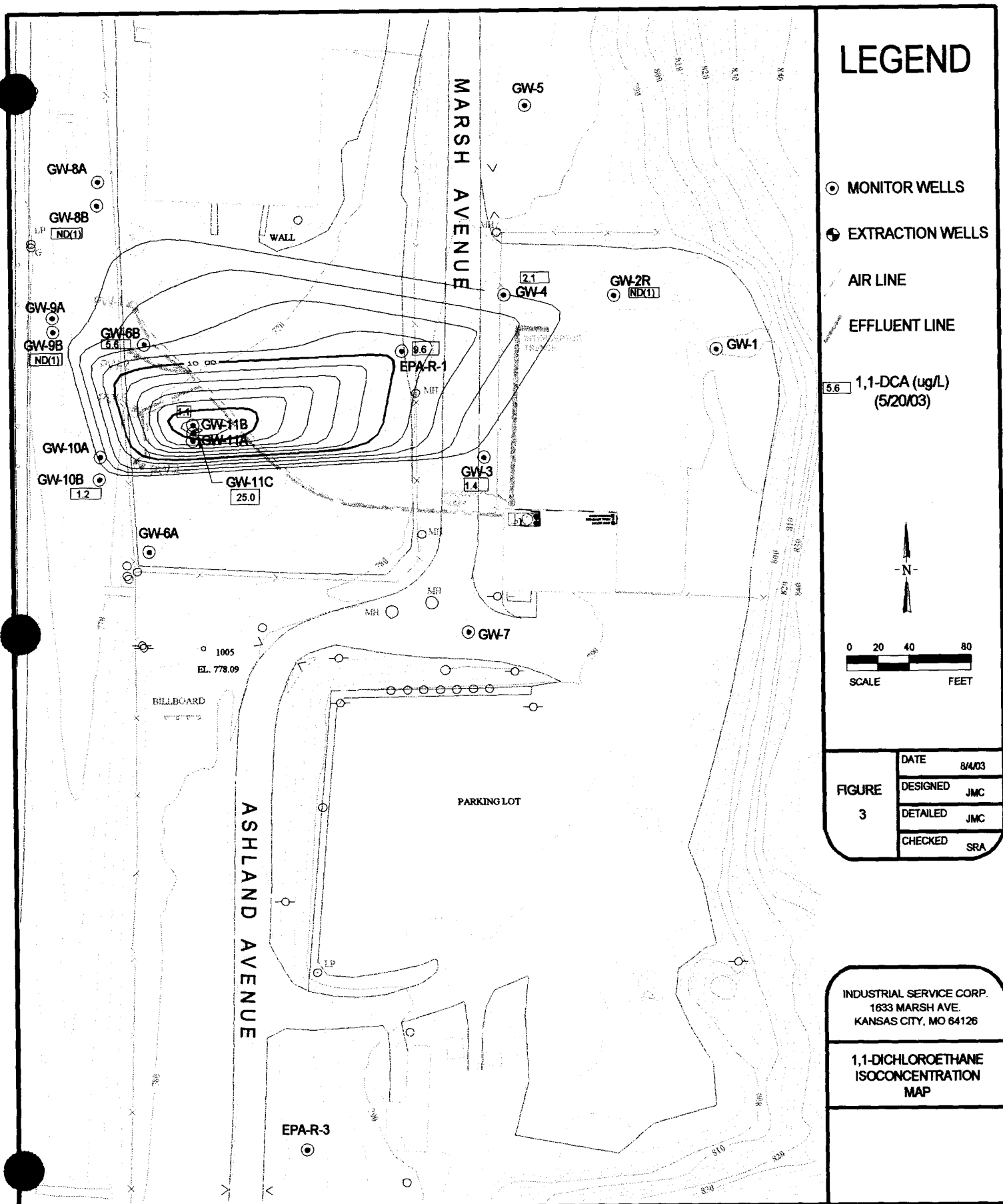
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DESIGNED	JMC
DETAILED	JMC
CHECKED	SRA

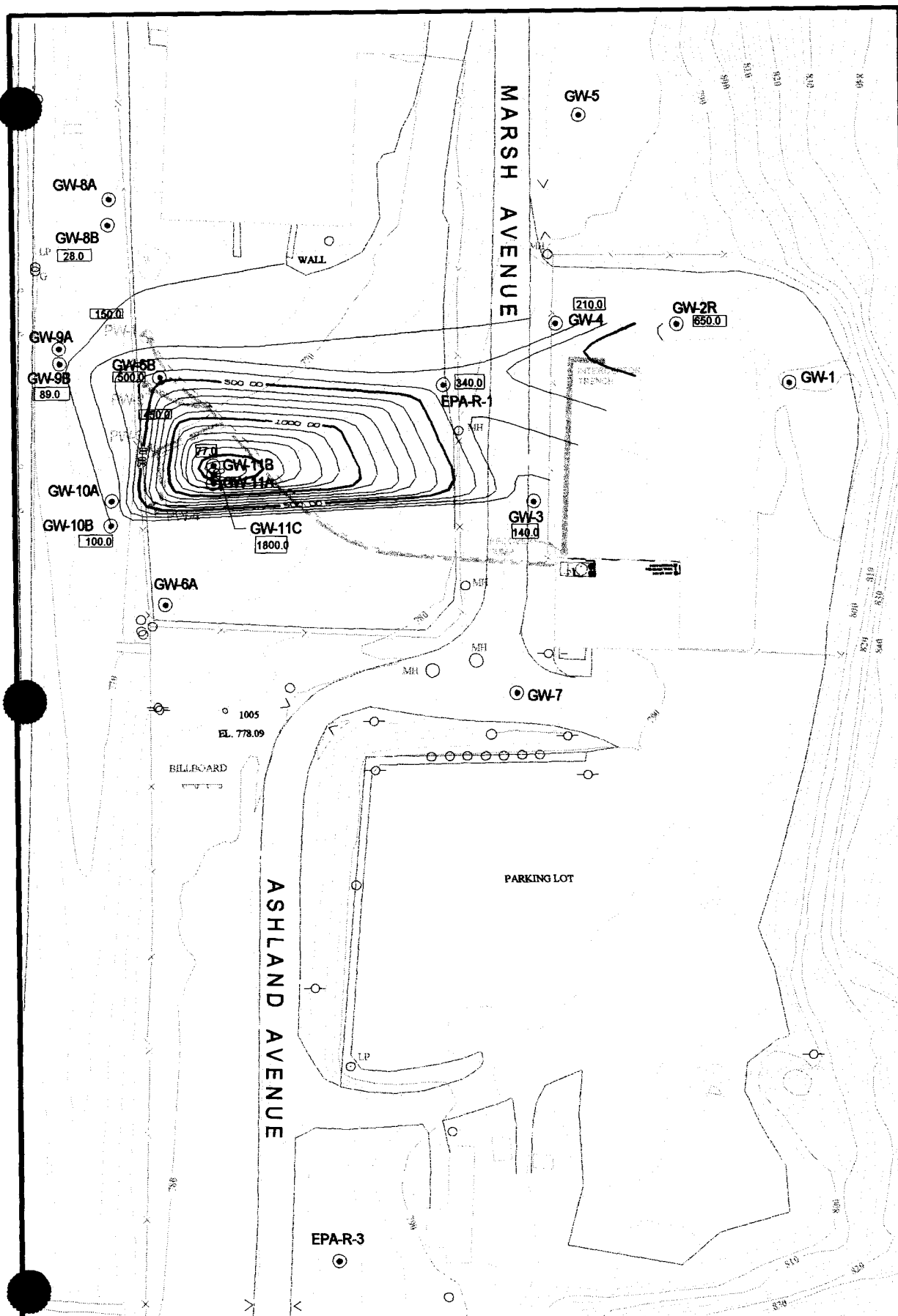
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KANSAS CITY, MO 64126

POTENTIOMETRIC SURFACE MAP

EQUIPOTENTIAL LINES CONSTRUCTED
UTILIZING "B" ZONE WELLS

Figure 3.8





LEGEND

- MONITOR WELLS
- ⊙ EXTRACTION WELLS
- AIR LINE
- EFFLUENT LINE
- 650.0 1,4-DIOXANE (ug/L)
(5/20/03)

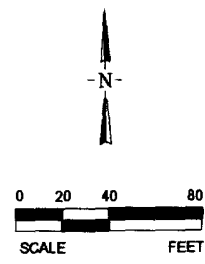
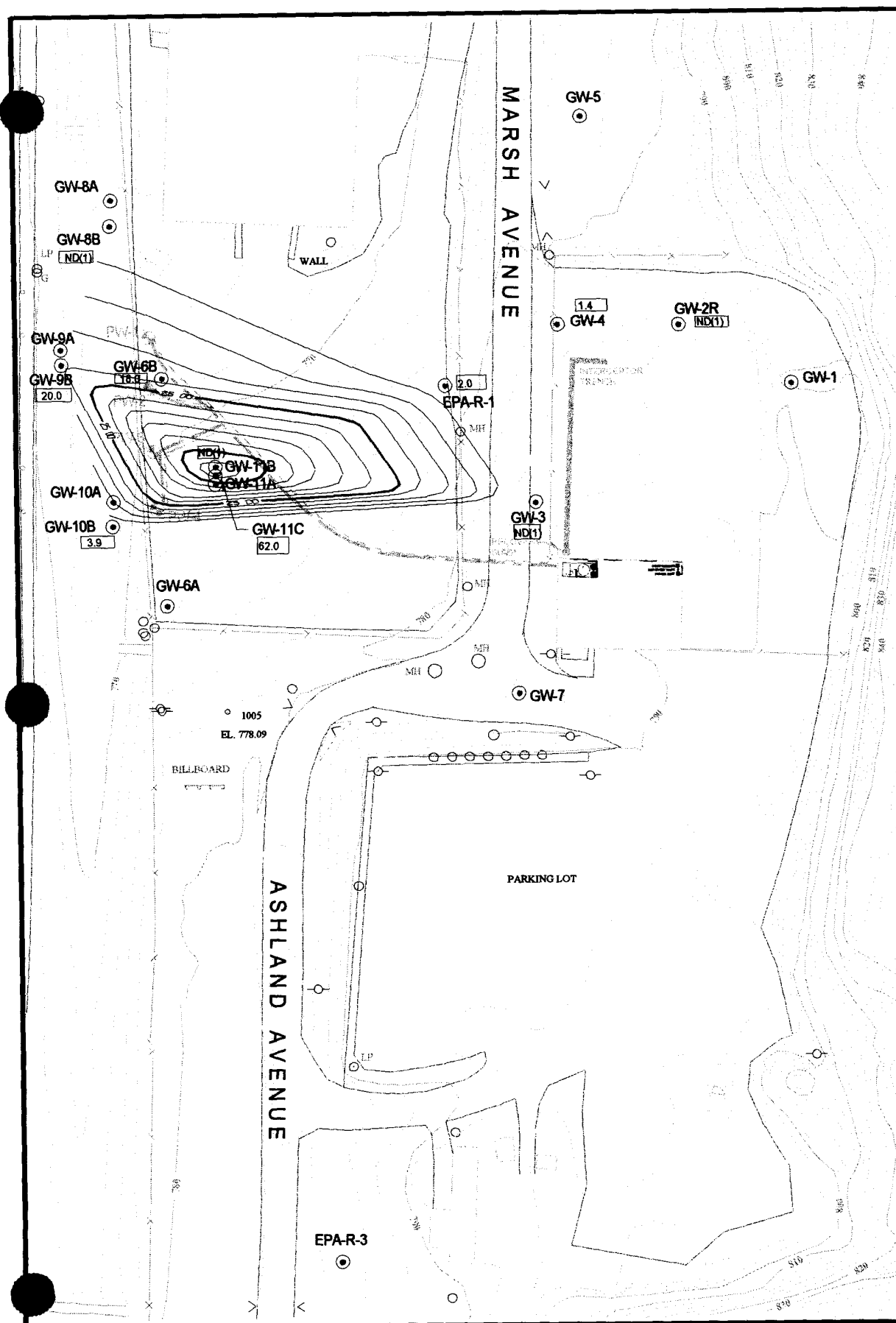


FIGURE 4	DATE	8/4/03
	DESIGNED	JMC
	DETAILED	JMC
	CHECKED	SRA

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1,4 - DIOXANE
ISOCONCENTRATION
MAP



LEGEND

- MONITOR WELLS
- EXTRACTION WELLS
- AIR LINE
- EFFLUENT LINE
- 62.0 cis-1,2-DCE (ug/L)
(5/20/03)

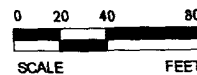
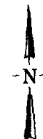
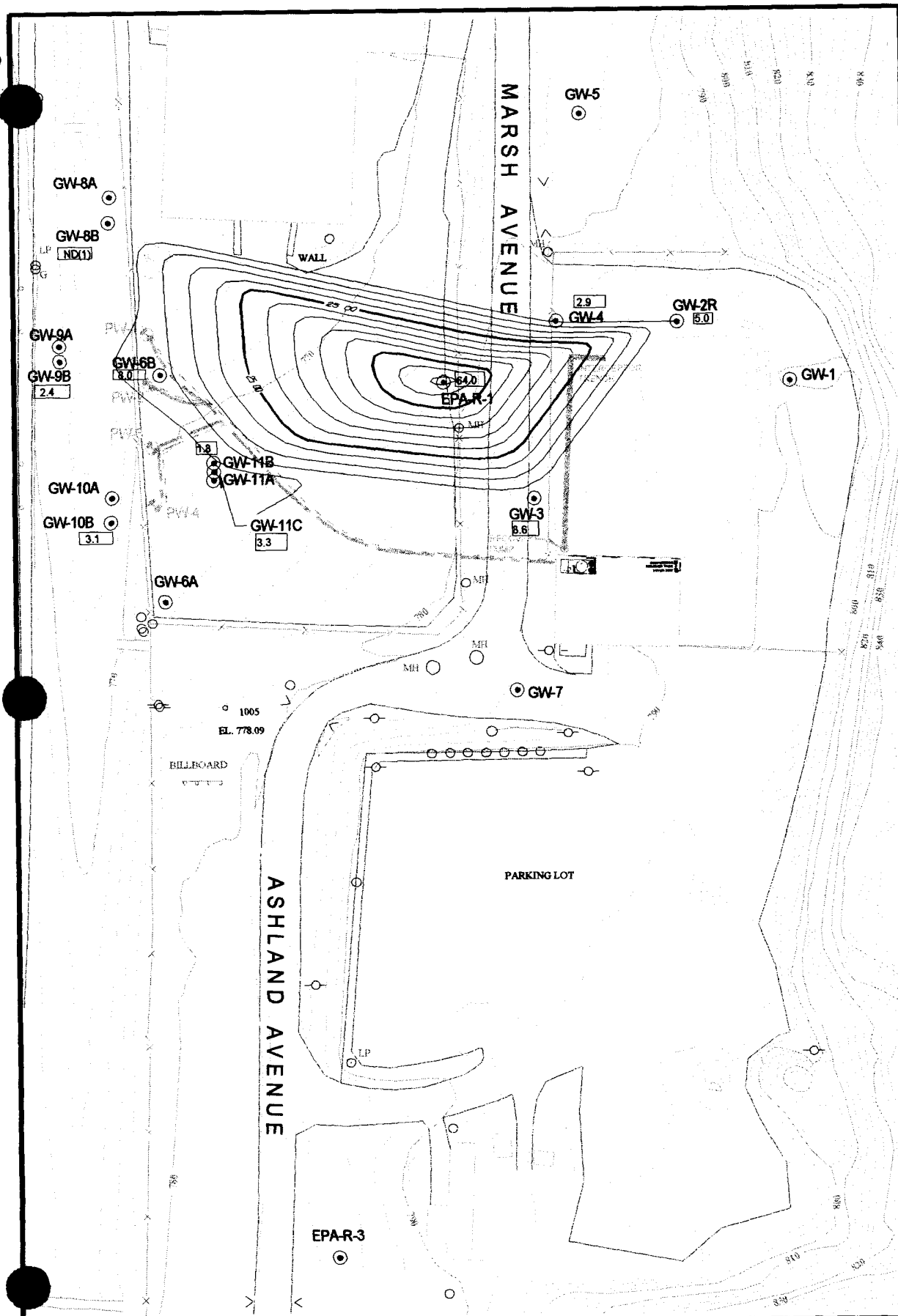


FIGURE 5	DATE	8/4/03
	DESIGNED	JMC
	DETAILED	JMC
	CHECKED	SRA

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cis-1,2-DICHLOROETHENE
ISOCONCENTRATION
MAP



LEGEND

- MONITOR WELLS
- EXTRACTION WELLS
- AIR LINE
- EFFLUENT LINE

64.0 MTBE (ug/L)
(5/20/03)

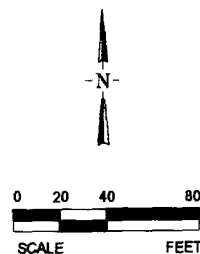
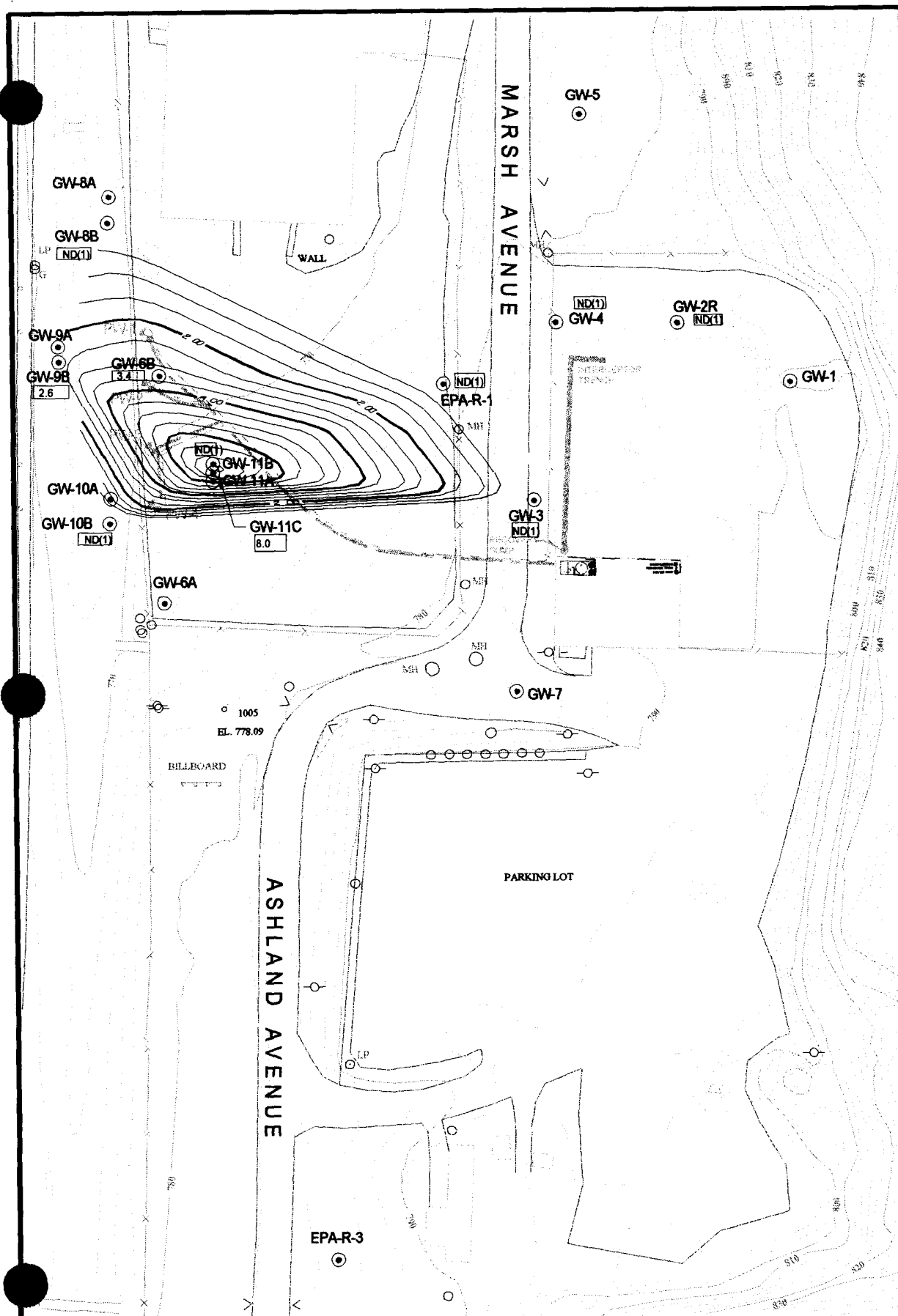


FIGURE 6	DATE	8/5/03
	DESIGNED	JMC
	DETAILED	JMC
	CHECKED	SRA

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KANSAS CITY, MO 64126

methyl tert-butyl ether
ISOCONCENTRATION
MAP



LEGEND

- MONITOR WELLS
- ⊗ EXTRACTION WELLS
- AIR LINE
- EFFLUENT LINE

2.6 TCE (ug/L)
(5/20/03)

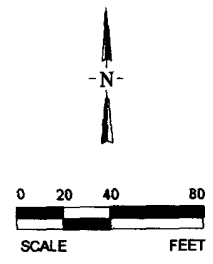
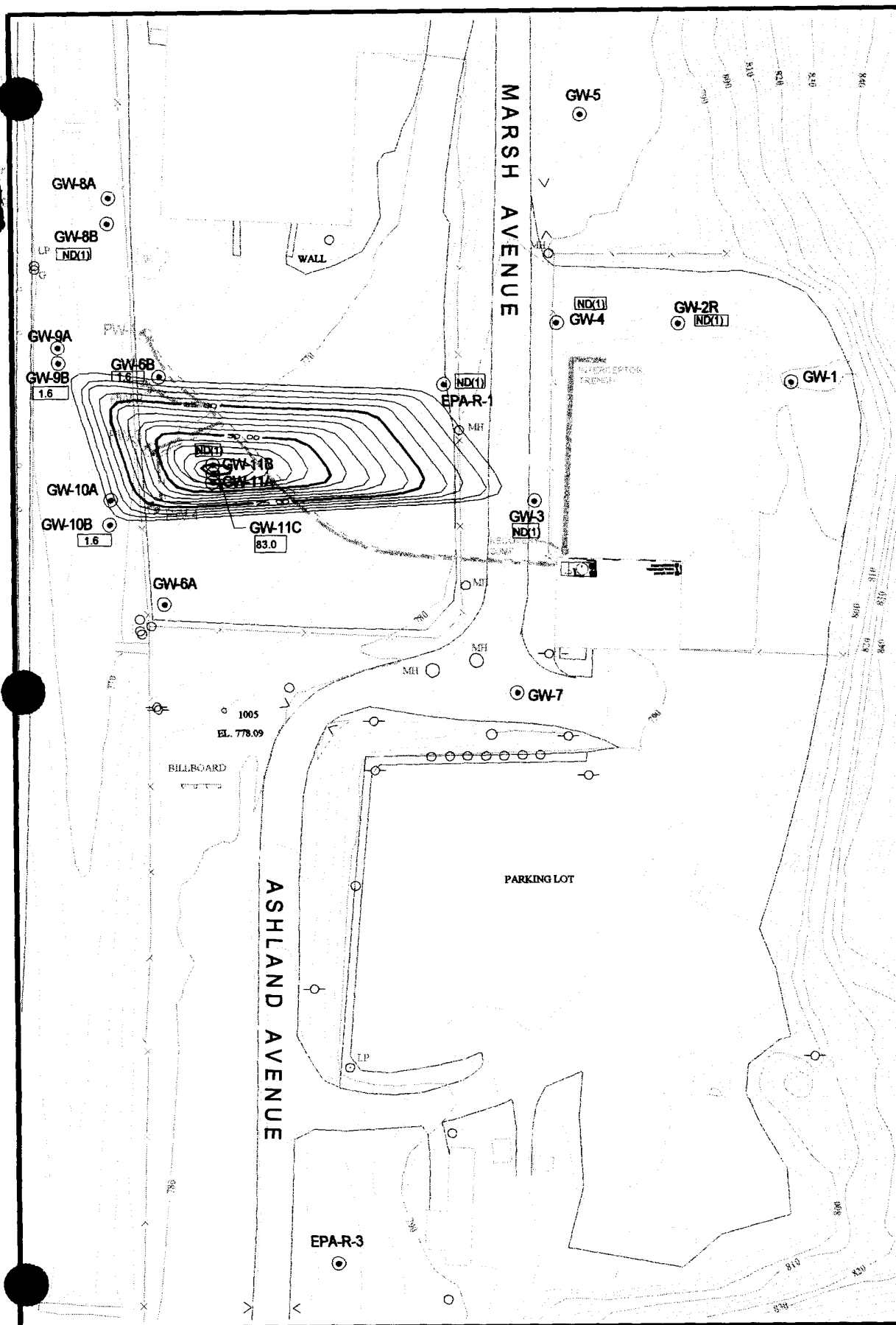


FIGURE 7	DATE	8/5/03
	DESIGNED	JMC
	DETAILED	JMC
	CHECKED	SRA

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KANSAS CITY, MO 64126

TRICHLOROETHENE
ISOCONCENTRATION
MAP



LEGEND

- MONITOR WELLS
- EXTRACTION WELLS
- AIR LINE
- EFFLUENT LINE
- 83.0 Vinyl Chloride (ug/L)
(5/20/03)

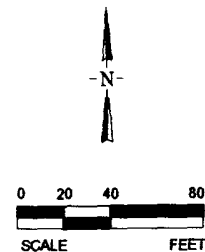


FIGURE 8	DATE	8/4/03
	DESIGNED	JMC
	DETAILED	JMC
	CHECKED	SRA

INDUSTRIAL SERVICE CORP.
1633 MARSH AVE.
KANSAS CITY, MO 64126

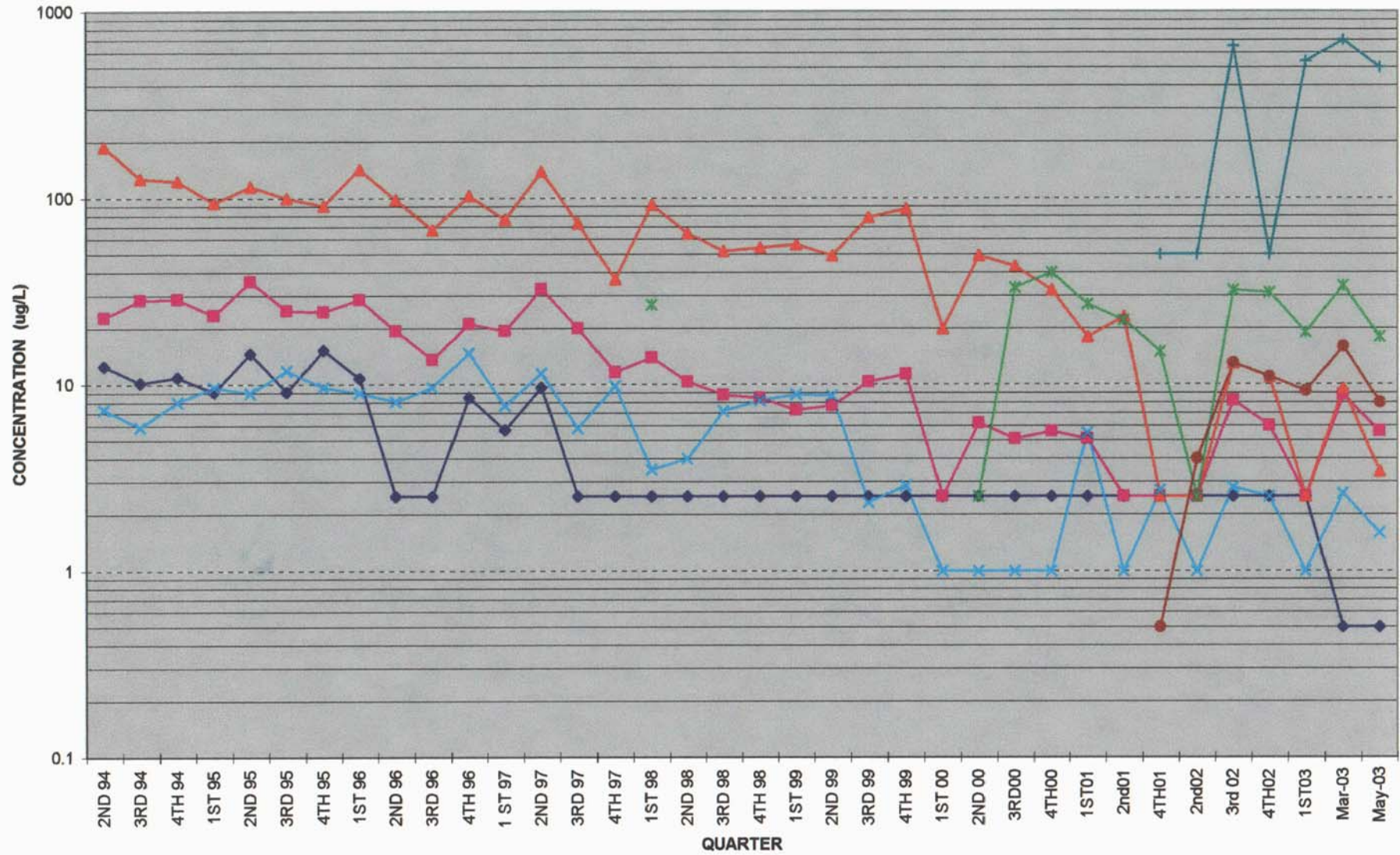
VINYL CHLORIDE
ISOCONCENTRATION
MAP

Time-series charts

Chapter 11

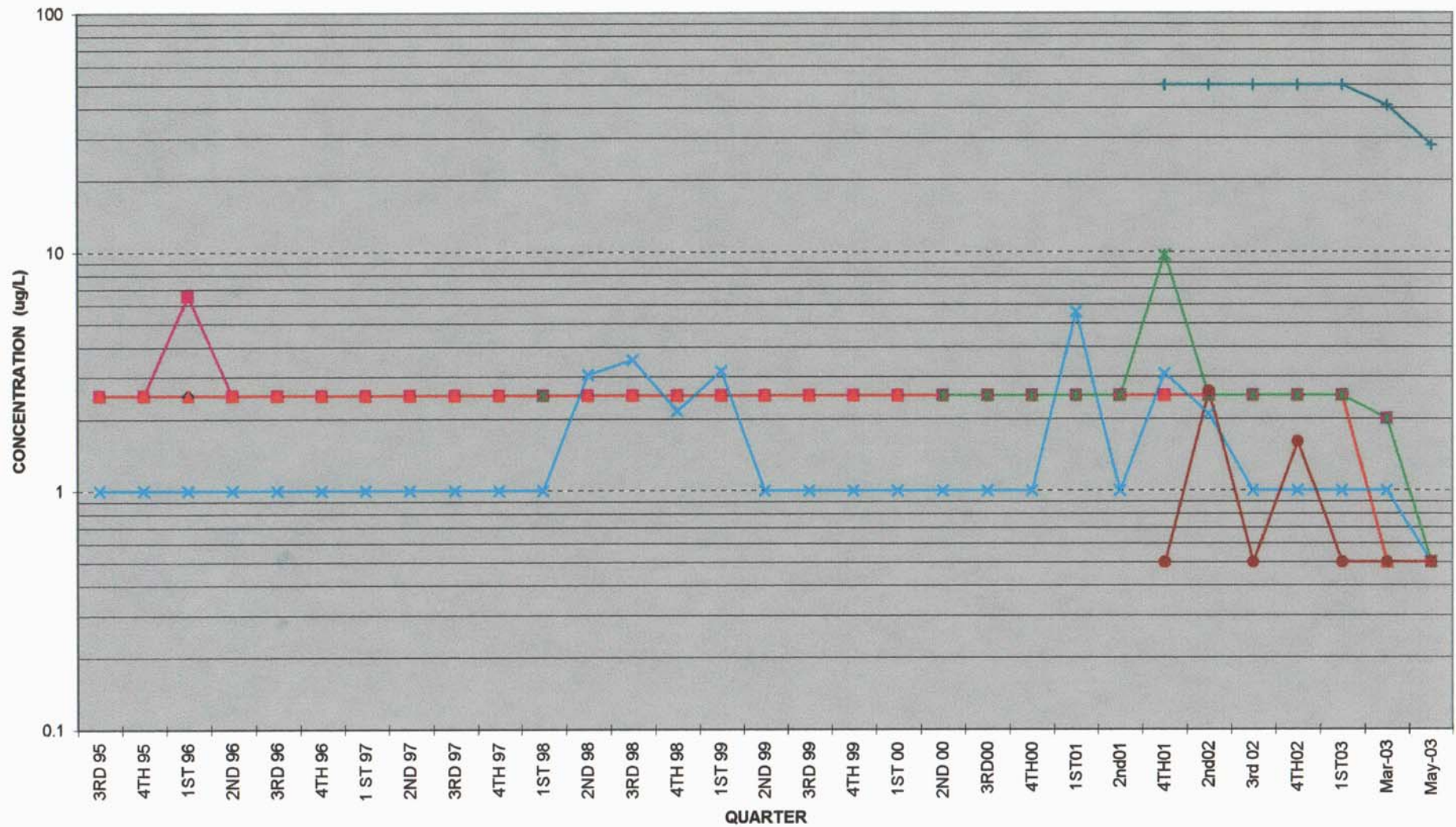
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GW-6B CONCENTRATION vs. TIME



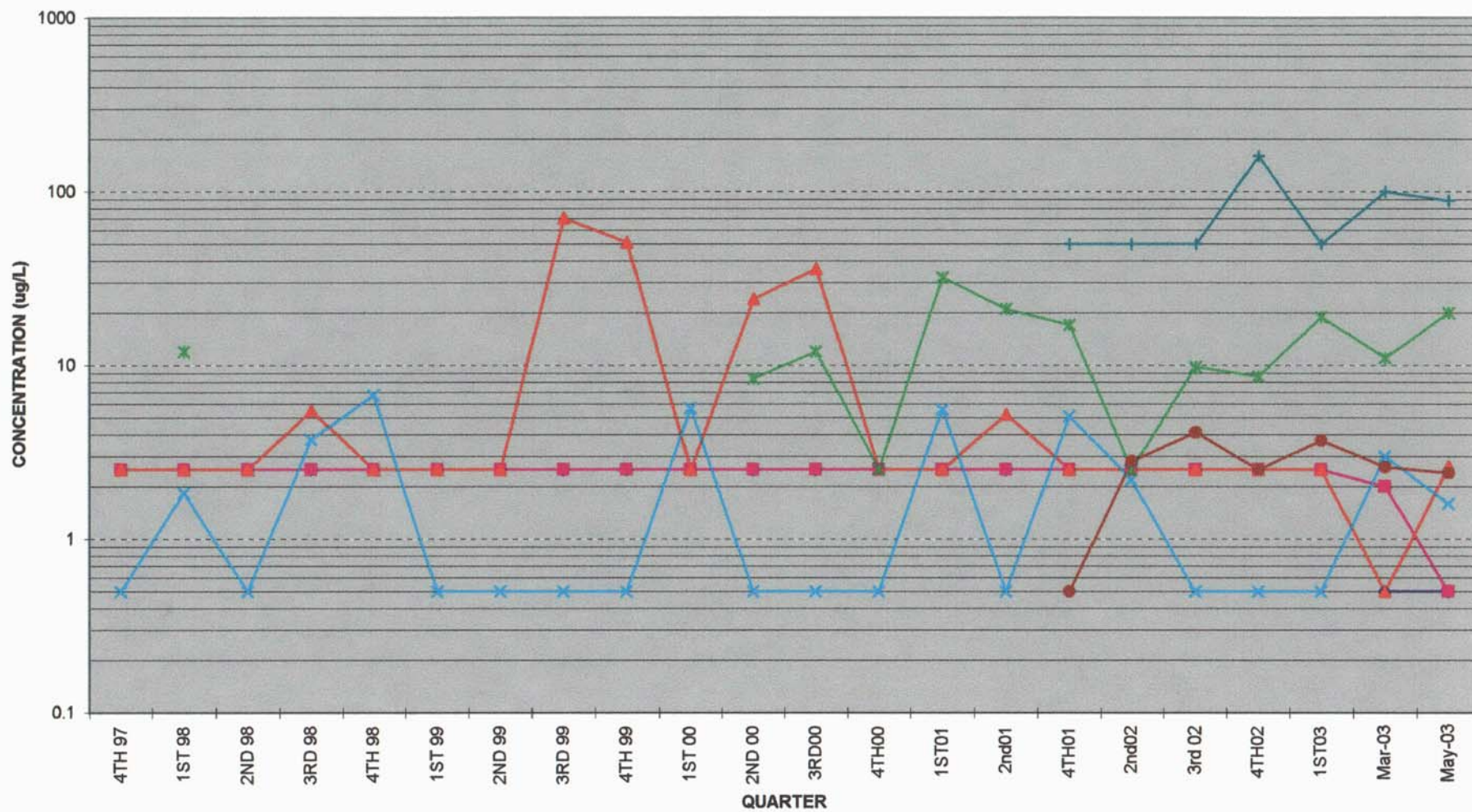
◆ CHLOROETHANE
■ 1,1 - DCA
▲ TRICHLOROETHENE
✕ VINYL CHLORIDE
✱ cis12DCE
● MTBE
+ 1,4-Dioxane

GW-8B CONCENTRATION vs. TIME



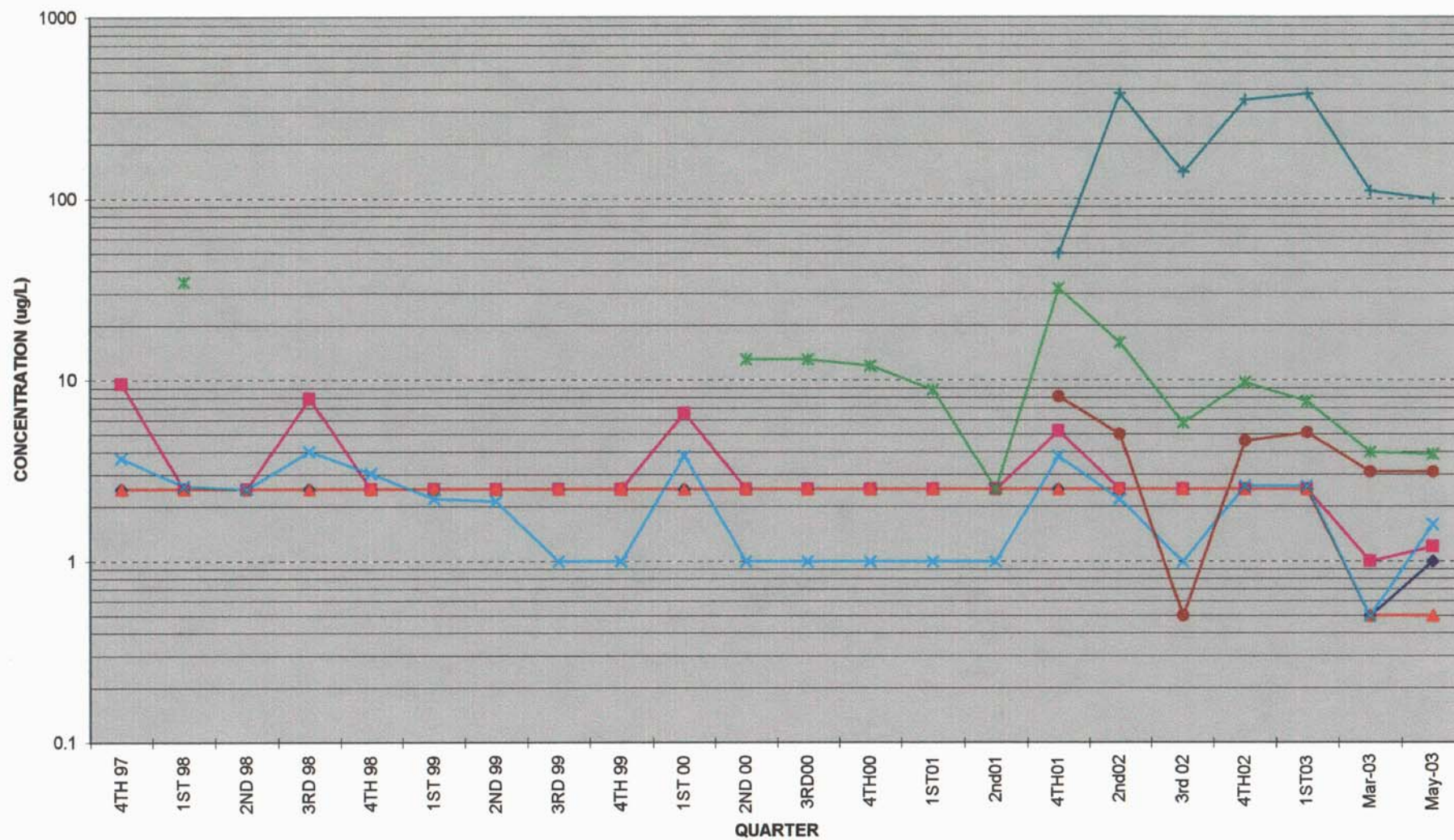
CHLOROETHANE 1,1 - DCA TRICHLOROETHENE VINYL CHLORIDE cis12DCE MTBE 1,4-Dioxane

GW-9B CONCENTRATION vs. TIME



◆ CHLOROETHANE
 ■ 1,1 - DCA
 ▲ TRICHLOROETHENE
 ✕ VINYL CHLORIDE
 ✱ cis12DCE
 ● MTBE
 + 1,4-Dioxane

GW-10B CONCENTRATION vs. TIME



CHLOROETHANE

1,1 - DCA

TRICHLOROETHENE

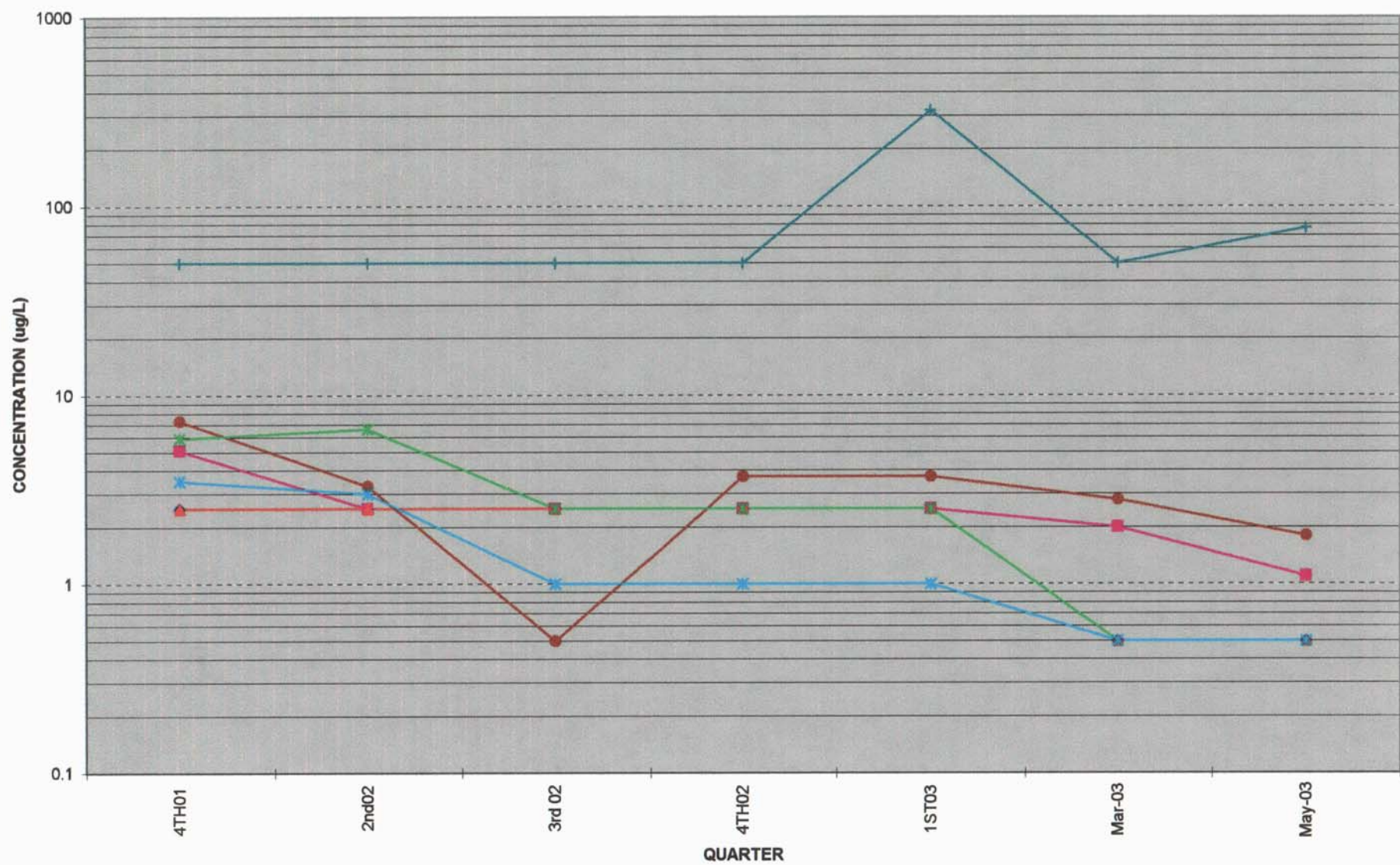
VINYL CHLORIDE

cis12DCE

MTBE

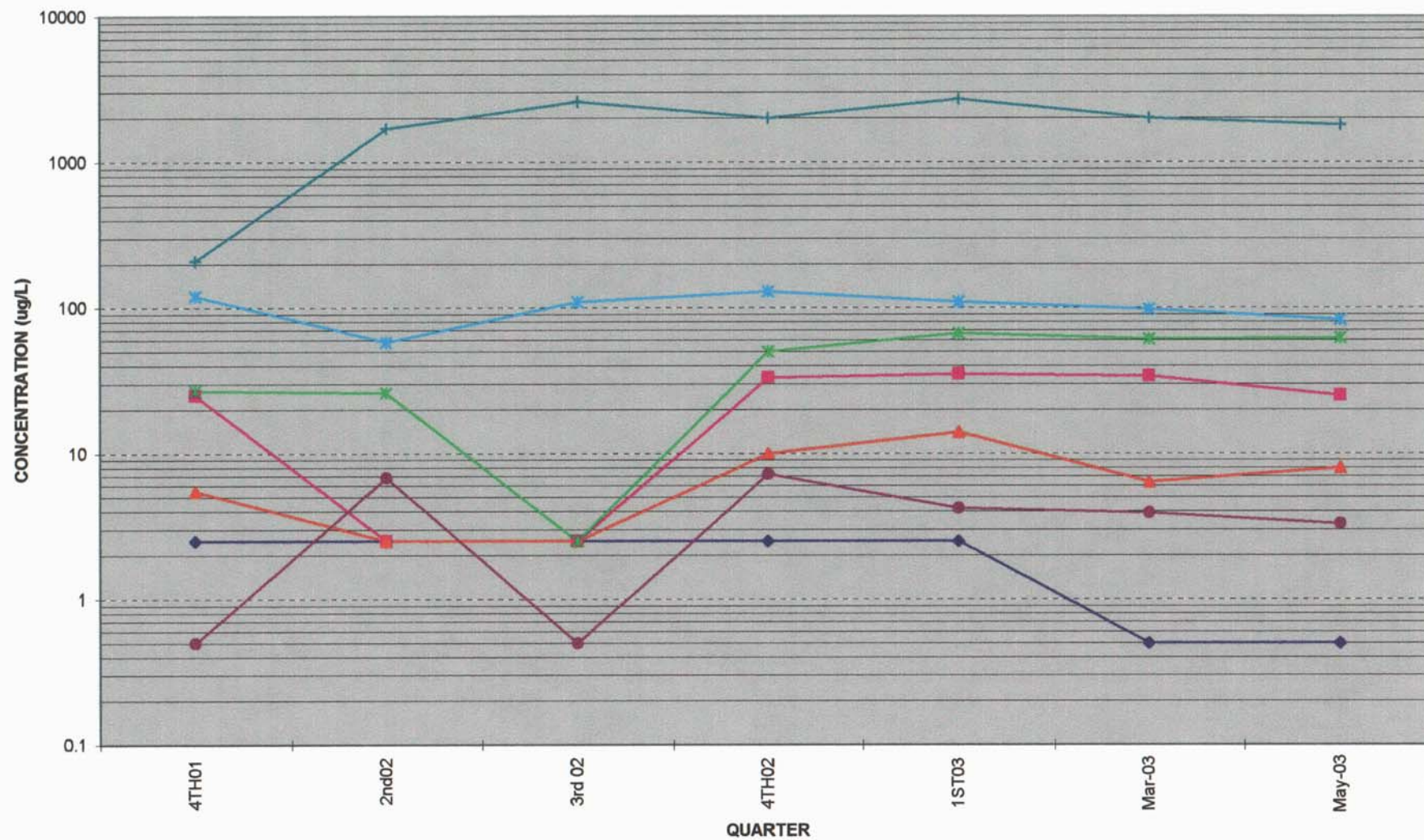
1,4-Dioxane

GW-11B CONCENTRATION vs. TIME

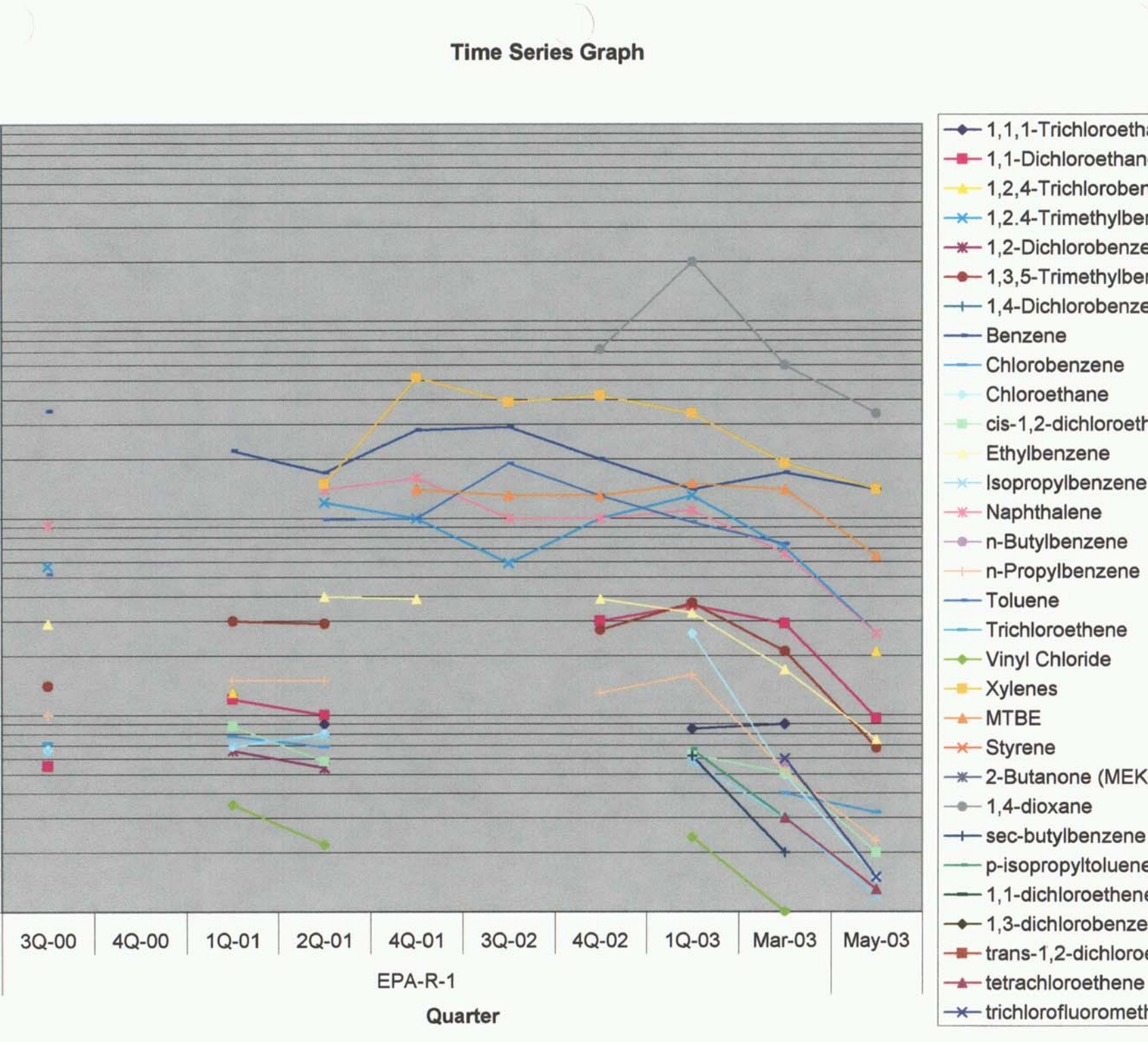


◆ CHLOROETHANE
■ 1,1 - DCA
▲ TRICHLOROETHENE
● MTBE
+ 1,4-Dioxane
* cis12DCE
* VINYL CHLORIDE

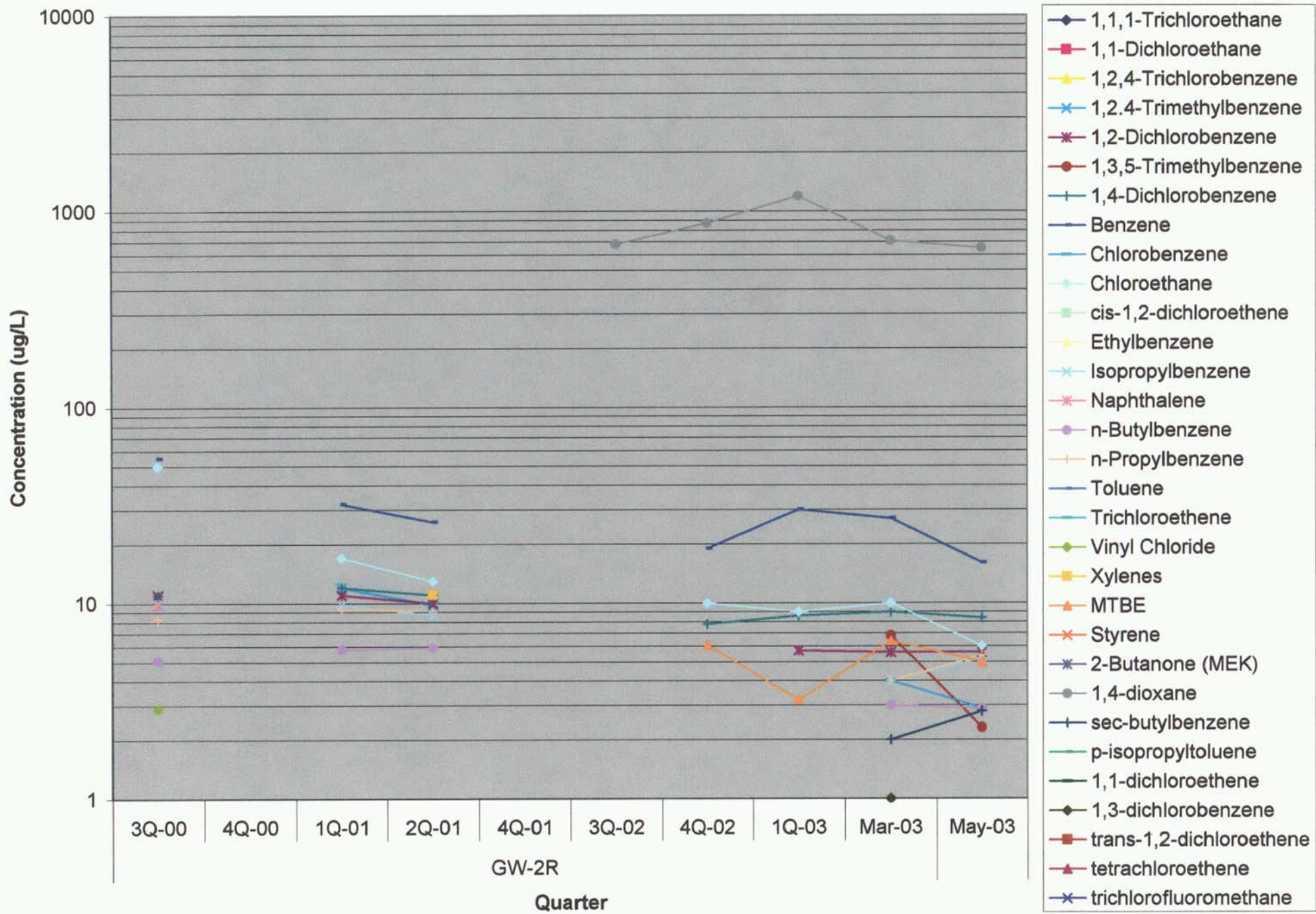
GW-11C CONCENTRATION vs. TIME

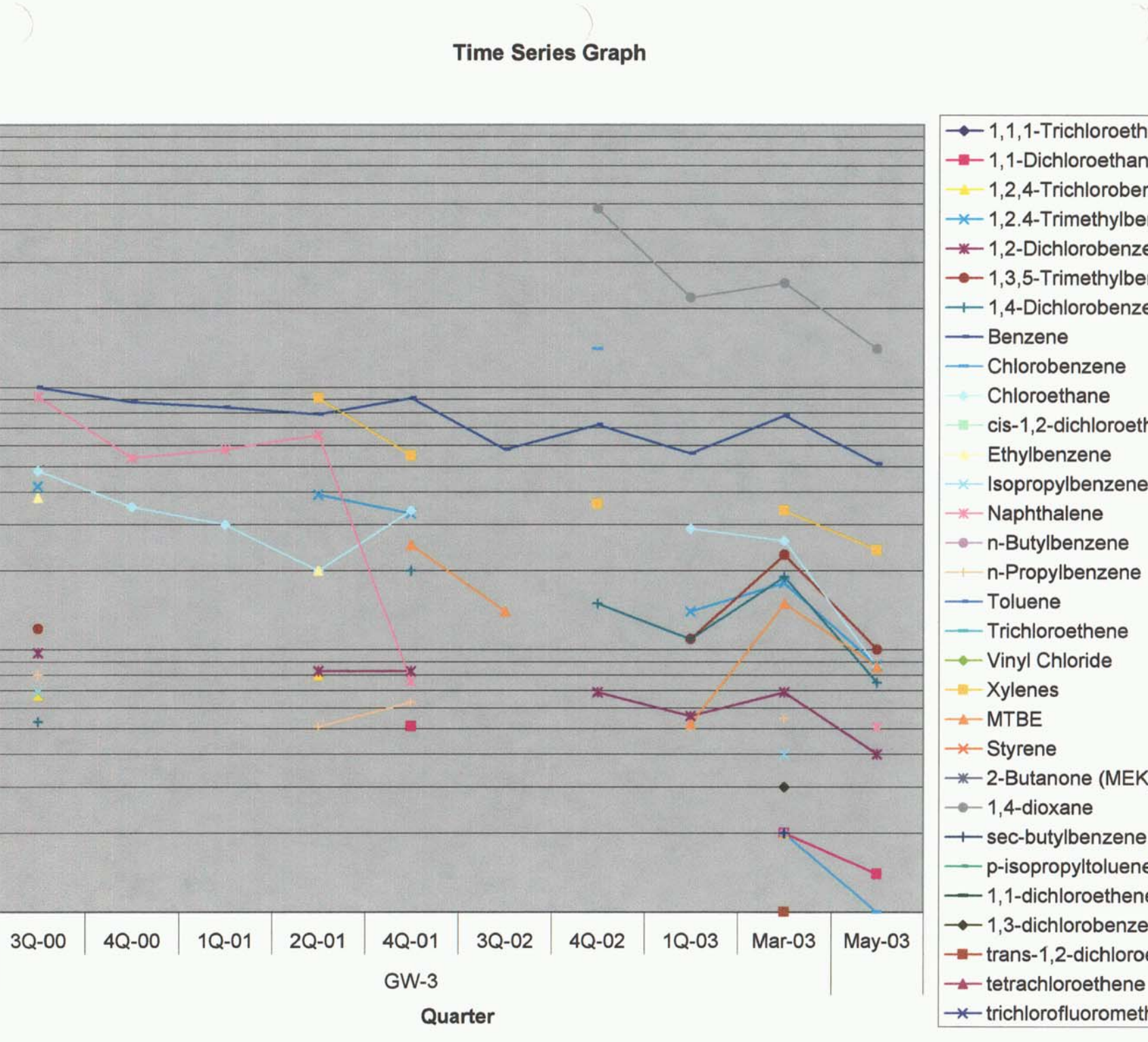


LNAPL charts



Time Series Graph





Time Series Graph

